

Weekly Report

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Intro

This week I briefly made a proposal for the new heterogeneous visual analysis on recommender system. The step-by-step model/data refinement project is still going on.

Readings & Research

Some details and design of heterogeneous data visualization mentioned last week are listed, including motivation, survey, system visual design and some other related topics.

Visual Heterogeneous Recommendation System(VHRS)

- **Motivation and Survey** The interpretation of a recommendation and interpretability of this recommendation process are always issues in the field of recommender system. As far as the customers are concerned, it is necessary to provide an interface to easily understanding how the recommendations come out. It is valuable as well for analysts to monitor the process to tune their algorithms or strategies in order to get the best recommendation performance of their system.
- **Goals** In order to provide an visual interactive interface for customers and analysts to enhance the interpretability of a recommender system, we present VHRS, an visual analysis system on recommendation processes and contexts. For customers, our system:
 - leads users into the recommendation reasoning process to build users' confidence on this system
 - increases users' feeling of involvement in the whole process as well as acceptance of recommendations;

for analysts, this system:

- provides an scale-free interactive exploration environment on connections and inferences on user profiles user behaviors and relevant context sources
- adjusts recommendation results by modifying active context informations and user behaviors
- (optional, still under development) provides a new approach of heterogeneous network data.

- Survey** Usually, visual interfaces and interaction with recommendation results can be one of the best solutions. However, previous works mainly focus on the visual representation of a single recommendation results[1]. The latest work in this issue[2] has presented a hybrid music recommendation system with an easy-to-read interactive interface, allowing user to not only understand the recommendation process but also perform interactions with the result. Another contribution of this work lies on an novel approach of combining many data resource used as extra contexts during recommendation. Survey on specific hybrid recommendation algorithms will be in later work. Circular layout(main layout of this system) has been widely used in many different scenarios in visualization. [3, 4, 5] are latest circular layout-based visualization I have ever met.
- Visual Design** To visually present the relations between user profiles, behaviors and context informations, we design a arc-and-round-based layout with same center, which uses the metaphor of “sun, cloud and rainbow” (another metaphor is rotary dial).

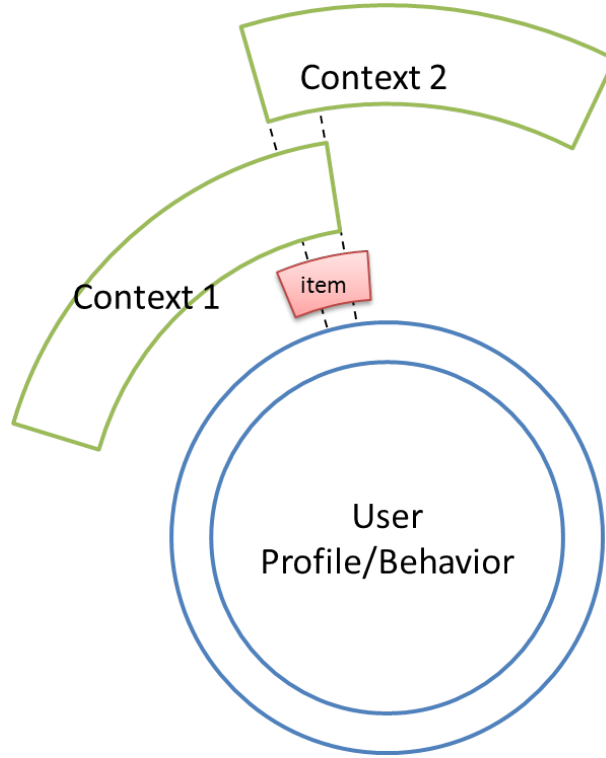


Figure 1: brief concept of visual design

The internal circle represents user(or user group) information, including user profile, tags and behaviors depending on the data, the outer larger arcs are contexts in this recommender system, and the smallest arc between user circle and context arc is the recommendation item generated by the system under the condition of contexts above and user profiles and behaviors below. Thickness, length and radius of arcs can represent properties of items or contexts as well as glyphs inside arcs.

Interactions to the visual objects are that:

- arcs are spinnable for we can put different context arcs above different items
- contexts are free to add in order to induce different contexts in this system.

- **Expected Contribution**

- (Application) An interactive visual analysis system for interpreting and exploring recommendations;
- (visual design) a novel visualization technique based on concentric circles and arcs.

Practice & Skills

None.

Miscellaneous

None.

Plan for Next Week

- **Todos on VHRS** There are some key issues in the project to be solved in the following week:
 1. The details of elements in the visual design need to be refined to represent enough information.
 2. Dataset becomes a problem. [6] provides a Douban collection which contains users on Douban with their online and real social network as well as ratings on books, movies and music. However, it is now not suitable for this project. while context-aware recommendation system datasets is the best.
 3. Analysis loop has not been clarified yet. Current design contains less analysis approaches for data exploration.
- Some new views will be implemented for the context-aware community detection project as in case study section the large data cases are to be emphasized.

References

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- [3] N. Cao, D. Gotz, J. Sun, Y.-R. Lin, and H. Qu, “SolarMap: Multifaceted Visual Analytics for Topic Exploration,” in *Data Mining (ICDM), 2011 IEEE 11th International Conference on*, pp. 101–110, 2011.
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